

Space Weather Forecast

Issued on Tuesday, 18 June 2024 at 00:10 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Isolated Moderate-class flares (R1-R2 radio blackouts) likely throughout.

Analysis of Space Weather Activity over past 24 hours

Stop Press: At the very end of this reporting period a large helicoidal prominence eruption was observed from the northeastern solar horizon (around 17/2330UTC). No satellite imagery is available at present to assess any resulting CME, however provisionally Earth impacts are felt to be unlikely. Elsewhere, the solar wind also showed a resurgence to become elevated – tentatively related to a resurgence in the ongoing coronal hole fast wind.

Solar Activity: Activity has been moderate, with three low-end Moderate-class flares observed. There are currently six sunspot regions on the facing side, with a seventh in the western solar hemisphere having faded in the period. The largest and most complex regions currently straddle the solar meridian. All three of these groups showed some changes in recent hours, with increasing complexity and/or size observed - trends which lend themselves to a greater risk of flares. The remaining groups appeared as unremarkable magnetic dipoles or monopoles near the western solar horizon, however this perhaps belies some complexity as evidenced by the late Moderate-class flare from a visually very minor sunspot group here.

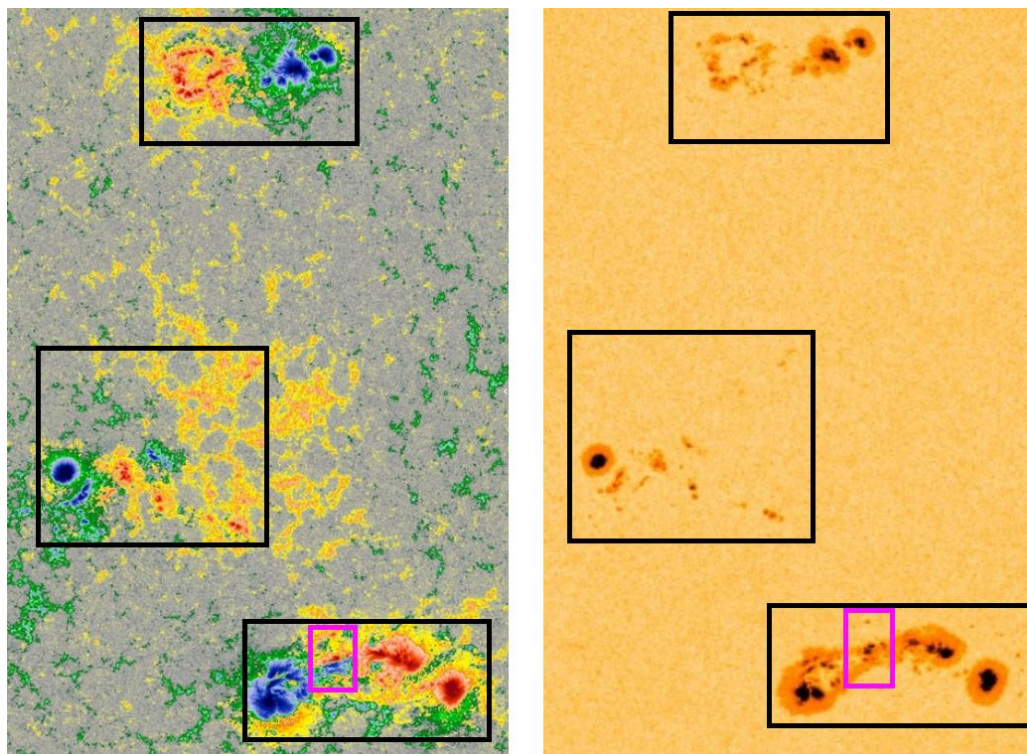


Figure 1: Magnetic and visible light imagery of the three main sunspot groups from 17/2300UTC. For scale, Earth fits inside the umbra (darkest circular region) of the leftmost spot in this image. The feature boxed in magenta is an unstable arrangement of two umbrae of opposite polarity in close proximity – this may be part of the cause of this sunspot group’s activity in recent days (termed a Mt Wilson ‘delta’ spot).

No clearly Earth-directed Coronal Mass Ejection (CMEs) were in evidence in available imagery at time of issue. Far-sided activity has dominated the limited offering of satellite imagery in the period, with events to the far southeast at 17/0800UTC and far-central-northeast 17/1100UTC perhaps linked in part to a large sunspot expected diametrically opposite Earth on the Sun's far side around the current time - this group delivered Strong-class activity on its last crossing of the front side a week ago.

Solar Wind / Geomagnetic Activity: Solar winds were generally slightly elevated in the period and perhaps most reflective of ongoing fast wind influence from a coronal hole. There were two discontinuities seen in many measures observed at 17/0300UTC and again at 17/1400UTC with uncertain mechanisms, perhaps best ascribed to natural variation within the current fast wind regime.

The solar wind speed was initially stable before undergoing a step-wise increase to peak elevated levels after 17/0300UTC waning over the ensuing nine hours. A second jump to was then seen at 17/1400UTC, levelling back by the period's end. The number of particles in the solar wind was unremarkable through these changes, remaining within normal background. The magnitude of the solar wind envelope varied between background and slightly elevated levels, while the north-south component was more stable and showed a gradual drift from mainly co-aligned with Earth's field to become mainly anti-aligned with time.

The net result of the above solar wind measures was for provisionally quiet but increasing geomagnetic activity.

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux observed by GOES18 remained at background levels, despite the Moderate-class X-ray flare activity.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate-class flares are likely, with a slight chance of isolated Strong-class flares. No significant regions depart in the period, however the prospect of some significant regions returning around midweek may serve to slightly raise the daily risk of flares from Wednesday 19 June.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast, and the current fast wind is the only one expected in the four days. Slightly elevated solar wind speeds are expected to continue at first, before declining back to background through UTC midweek.

Geomagnetic activity is expected to fall from current levels, becoming more reliably quiet from midweek.

Energetic Particles / Solar Radiation: High energy proton flux is expected to remain at background levels, with a slight but increasing chance of reaching Minor solar radiation S1 levels following any significant X-ray flares.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	60	70	70	70
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	15	10	10	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)